OKLAHOMA
Tax Commission

CAPITALIZATION RATE STUDY

JANUARY 2023

AD VALOREM
PUBLIC SERVICE SECTION

PO Box 269060 Oklahoma City, OK 73126-9060 | 405.319.8215

OKLAHOMA
Tax Commission

AD VALOREM
April 26, 2023

The Public Service Section acknowledges the contribution of those individuals taking part in the development of our capitalization rates for 2023.

This is an ongoing process. It is our intent to be as transparent as possible while being receptive to any input given.

We look forward to your continued participation in this process.

Sincerely,

Ryan Snyder
Administrator
Oklahoma Tax Commission
Ad Valorem

PO Box 269060 | Oklahoma City, OK | 73126-9060
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EXECUTIVE SUMMARY

Executive Summary

The income approach to value converts projected future income or cash flow into an estimate of present value. The accuracy of this approach is no greater than the validity of the assumptions used to estimate the key variables, particularly the capitalization rate variable. The mathematical techniques used in the approach convert those assumptions into an estimate of current market value.

This booklet contains a study of each of the eight state assessed industry groups in Oklahoma. Industry data was gathered by group as identified by Value Line Investment Survey published from the period of November 2022 through January 2023. Additional Value Line Industry segments including Oil/Gas Distribution and Pipeline MLPs were reviewed. Telecommunications Utility Industry was merged with Telecommunications Services as of September 2022.

Generally accepted appraisal procedures were used to estimate the cost of capital for debt and equity. The long term debt cost is the cost for a particular risk class of debt on the lien date. The equity rate reflects the rate of return or compensation that will satisfy the risk that a prospective purchaser would assume by investing in the property.

Authority for Valuation

Oklahoma Tax Commission Ad Valorem is charged with the responsibility for the valuation of Railroad, Air Carrier, and Public Service Corporation property in accordance with Title 68, Oklahoma Statutes, Section 2808. The term “public service” includes electric companies, fluid or product pipeline companies, gas distribution and transmission companies, telecommunication companies, and water companies.

Nominal Growth Rate

For the typical income projection of the valuation of Railroad, Air Carrier, and Public Service Corporation property, a nominal growth rate of 3.41% will be applied.

Band of Investment, Capital Structure

A representative capital structure is developed for each industry using the market value of equity and the book value of long term debt. Using Value Line Investment Survey the market value of equity can be calculated by multiplying the number of shares outstanding by the listed stock price, or by utilizing the given market capitalization number already calculated. The debt components are book amounts unless market amounts are readily available and predetermined to be significantly different. Preferred stock was excluded in the calculations for all industry types.

The rates of debt and equity capital are weighted by the respective amounts of such capital deemed most likely to be employed by a prospective buyer. The result is a representative or typical capital structure of an industry group of companies, not that of the present owner.

Cost of Debt

Cost of debt was calculated as the twelve month bond yield average from Mergent Bond Record for public utility and industrial bonds utilizing the bond rating perceived as typical for each industry.

Cost of Capital

Equity rate calculations were derived upon review of Discounted Cash Flow, Capital Asset Pricing Model (CAPM), and Earnings Price Ratio.

Discounted Cash Flow (Gordon Growth Model) allows for the calculation of two rates within its model utilizing the dividend yield, dividend growth rate estimates, and earnings growth rate estimates as listed in Value Line Investment Survey. Cost of capital being calculated for dividends by adding the dividend yield and the dividend estimate. Similarly the cost of capital for earnings is calculated by adding the dividend yield and the earnings estimate. No calculation is utilized where the resulting yield or growth estimate equity rate is below the chosen cost of debt for each respective industry.

Capital Asset Pricing Model (CAPM) in the application of the CAPM, the most sensitive component affecting the outcome is the estimate of the beta statistic. A choice of time frames and frequencies of measurement in the calculation of the beta can produce significantly different results. Another factor in the use of beta is the choice of whether to use an unadjusted beta or a beta adjusted to reflect the fact that betas revert to the mean over time. For this study the company levered betas as developed and presented in The Value Line Investment Survey for the selected industry groups are used.

Earnings Price Ratios (E/P Ratio) utilizing Value Line Investment Survey for the selected industry groups, the E/P Ratio was calculated with the projected earnings divided by the recent price.

Flotation Costs

Flotation costs are those costs associated with the issuance of new securities and include both the underwriting spread and the costs incurred by the issuing company from the offering. Financial theory suggests and evidence supports that firms do not typically issue new common equity as a matter of common practice. Therefore in determining a capitalization rate, no adjustment will be made in the capitalization rate or the income stream for hypothetical flotation costs. Flotation costs actually incurred may be accounted for in the income stream.

Utilization of Other Studies and Data

Valuation staff has considered and where appropriate utilized data and capitalization studies submitted by assessed and interested parties in the development of the derived rates.

The capitalization rates published in this study are intended to be applied to the unitary operations of those companies subject to central valuation and assessment by the Oklahoma State Board of Equalization.

Industry Capitalization Rate Summary

Industry	*Equity Rate*	*Debt Rate*	*Market Capitalization*	*Long Term Debt*	*Capitalization Rate*
Airlines					
Cargo	12.75%	5.11%	87.06%	12.94%	11.76%
Passenger	17.25%	5.11%	48.11%	51.89%	10.95%
Electric	10.35%	5.03%	59.40%	40.60%	8.19%
Fluid Pipelines (Petroleum Integrated)	14.75%	5.11%	88.52%	11.48%	13.64%
Gas Distribution (Natural Gas Utility)	11.00%	5.03%	62.57%	37.43%	8.77%
Gas Transmission	15.35%	5.11%	60.53%	39.47%	11.31%
Railroad	12.20%	5.11%	81.68%	18.32%	10.90%
Telecommunications Services	12.10%	5.11%	60.48%	39.52%	9.34%
Water	10.20%	5.03%	71.10%	28.90%	8.71%

Mergent 2022 Twelve Month Bond Yield Averages

Airlines Industry

2023 Capitalization Rate Study
Airline Industry Notes

- Recognizing the different operational services as provided by this industry group, it was broken out into two segments, cargo and passenger service.

- Staff considered capitalization studies and/or information submitted by:

  No Submissions

- Staff relied upon the results of the following models and appraisal judgment in the development of equity rates:

  1. Discounted Cash Flow
  2. Capital Asset Pricing Model, Ex-Post and Ex-Ante
  3. Earnings/Price Ratio

Industry Capitalization Rate

Industry		*Equity Rate*	*Market Capitalization*	*Long Term Debt*	*Capitalization Rate*
Airlines					
	Cargo	12.75%	87.06%	12.94%	11.76%
	Passenger	17.25%	48.11%	51.89%	10.95%

Mergent 2022 Twelve Month Bond Yield Averages

Industry Equity Rate Summary

Airlines

Cargo

CapM Ex Post Equity Rate	10.14%
CapM Ex Ante Equity Rate	11.27%
DCF (Dividend) Equity Rate	12.50%
DCF (Earnings) Equity Rate	14.67%
Earnings Price Ratio	12.60%

Passenger

CapM Ex Post Equity Rate	14.84%
CapM Ex Ante Equity Rate	16.81%
DCF (Dividend) Equity Rate	20.38%
DCF (Earnings) Equity Rate	32.25%
Earnings Price Ratio	26.93%

CapM Equity Rates

Industry		Ex Post Risk Premium b*	Ex Ante Risk Premium c*	Value Line Beta d	Ex Post CAPM Equity Rate (((b-3.87%)*d)+3.87%)	Ex Ante CAPM Equity Rate (((c-3.87%)*d)+3.87%)
Airlines						
	Cargo	11.04%	12.33%	0.88	10.14%	11.27%
	Passenger	11.04%	12.33%	1.53	14.84%	16.81%

b* Risk Free Rate (3.87%) plus Risk Premium Rate (7.17%)
c* Risk Free Rate (3.87%) plus Risk Premium Rate (8.46%)
20-Yr LT Treasury Yield, Value Line Investment Survey, November 2022 through January 2023, Kroll Cost of Capital Navigator

Discounted Cash Flow (Gordon Growth)

Industry	Company	Value Line Strength	Market Capitalization d	Dividend Yield e	Growth Estimate Dividends f	Growth Estimate Earnings g	Equity Rate Dividend (e+f)	Equity Rate Earnings (e+g)
Airlines								
Cargo								
	Air Transport Services Group	B+	2,100,000,000	0.00%	0.00%	13.00%		13.00%
	Atlas Air Worldwide Holdings	B	2,800,000,000	0.00%	0.00%	3.50%		
	FedEx Corp.	A+	41,400,000,000	2.90%	11.50%	13.00%	14.40%	15.90%
	United Parcel Service, Inc.	A+	146,000,000,000	3.60%	7.00%	11.50%	10.60%	15.10%
Median			22,100,000,000				12.50%	15.10%
Arithmetic Mean			48,075,000,000				12.50%	14.67%
Passenger								
	Alaska Air Group, Inc.	B	5,700,000,000	0.00%	21.50%	0.00%	21.50%	
	Allegiant Travel Company	B+	1,400,000,000	0.00%	17.00%	53.50%	17.00%	53.50%
	American Airlines Group	C+	9,300,000,000	0.00%	0.00%	0.00%		
	Copa Holdings, S.A.	B	3,100,000,000	0.00%	23.50%	0.00%	23.50%	
	Delta Air Lines, Inc.	B+	21,400,000,000	0.00%	5.00%	0.00%		
	JetBlue Airways Corp.	B	2,500,000,000	0.00%	0.00%	0.00%		
	SkyWest, Inc.	B+	899,100,000	0.00%	0.00%	11.00%		11.00%
	Southwest Airlines	B+	22,200,000,000	0.50%	19.00%	0.00%	19.50%	
	Spirit Airlines, Inc.	B	2,400,000,000	0.00%	0.00%	0.00%		
	United Airlines Holdings, Inc.	C++	14,000,000,000	0.00%	0.00%	0.00%		
Median			4,400,000,000				20.50%	32.25%
Arithmetic Mean			8,289,910,000				20.38%	32.25%

Value Line Investment Survey, November 2022 through January 2023

E/P Ratio

Industry	Company	Value Line Strength	Market Capitalization c	Recent Price d	Projected Earnings e	E/P Ratio (e/d)
Airlines						
Cargo						
	Air Transport Services Group	B+	2,100,000,000	28.58	2.75	9.62%
	Atlas Air Worldwide Holdings	B	2,800,000,000	100.44	15.00	14.93%
	FedEx Corp.	A+	41,400,000,000	159.24	27.00	16.96%
	United Parcel Service, Inc.	A+	146,000,000,000	169.13	15.00	8.87%
Median			22,100,000,000			12.28%
Arithmetic Mean			48,075,000,000			12.60%
Passenger						
	Alaska Air Group, Inc.	B	5,700,000,000	45.04	9.50	21.09%
	Allegiant Travel Company	B+	1,400,000,000	77.98	30.25	38.79%
	American Airlines Group	C+	9,300,000,000	14.32	4.25	29.68%
	Copa Holdings, S.A.	B	3,100,000,000	76.31	12.70	16.64%
	Delta Air Lines, Inc.	B+	21,400,000,000	33.36	7.50	22.48%
	JetBlue Airways Corp.	B	2,500,000,000	7.68	3.00	39.06%
	SkyWest, Inc.	B+	899,100,000	17.77	6.00	33.76%
	Southwest Airlines	B+	22,200,000,000	37.40	5.00	13.37%
	Spirit Airlines, Inc.	B	2,400,000,000	21.87	5.00	22.86%
	United Airlines Holdings, Inc.	C++	14,000,000,000	42.78	13.50	31.56%
Median			4,400,000,000			26.27%
Arithmetic Mean			8,289,910,000			26.93%

Value Line Investment Survey, November 2022 through January 2023

Capital Structure

Industry	Company	Value Line Strength	Market Capitalization c	Long Term Debt d	Debt/Equity Ratio (d/c)	Percentage Equity (c/(c+d))	Percentage Debt (d/(c+d))
Airlines							
Cargo							
	Air Transport Services Group	B+	2,100,000,000	1,369,000,000	0.65	60.54%	39.46%
	Atlas Air Worldwide Holdings	B	2,800,000,000	1,578,900,000	0.56	63.94%	36.06%
	FedEx Corp.	A+	41,400,000,000	19,918,000,000	0.48	67.52%	32.48%
	United Parcel Service, Inc.	A+	146,000,000,000	17,769,000,000	0.12	89.15%	10.85%
Median			22,100,000,000	9,673,950,000	0.52	65.73%	34.27%
Arithmetic Mean			48,075,000,000	10,158,725,000	0.45	70.29%	29.71%
Weighted Average			119,824,284,971	17,816,822,777		87.06%	12.94%
Passenger							
	Alaska Air Group, Inc.	B	5,700,000,000	1,889,000,000	0.33	75.11%	24.89%
	Allegiant Travel Company	B+	1,400,000,000	1,840,000,000	1.31	43.21%	56.79%
	American Airlines Group	C+	9,300,000,000	34,185,000,000	3.68	21.39%	78.61%
	Copa Holdings, S.A.	B	3,100,000,000	1,350,200,000	0.44	69.66%	30.34%
	Delta Air Lines, Inc.	B+	21,400,000,000	21,202,000,000	0.99	50.23%	49.77%
	JetBlue Airways Corp.	B	2,500,000,000	3,235,000,000	1.29	43.59%	56.41%
	SkyWest, Inc.	B+	899,100,000	2,982,000,000	3.32	23.17%	76.83%
	Southwest Airlines	B+	22,200,000,000	8,315,000,000	0.37	72.75%	27.25%
	Spirit Airlines, Inc.	B	2,400,000,000	2,658,000,000	1.11	47.45%	52.55%
	United Airlines Holdings, Inc.	C++	14,000,000,000	28,602,000,000	2.04	32.86%	67.14%
Median			4,400,000,000	3,108,500,000	1.20	45.52%	54.48%
Arithmetic Mean			8,289,910,000	10,625,820,000	1.49	47.94%	52.06%
Weighted Average			15,563,116,859	16,783,548,147		48.11%	51.89%

Value Line Investment Survey, November 2022 through January 2023

Beta

Industry	*Company*	*Value Line Levered Beta*
Airlines, Selected Comparables		
Cargo		
	Air Transport Services Group	0.80
	Atlas Air Worldwide Holdings	0.75
	FedEx Corp.	1.10
	United Parcel Service, Inc.	0.85
Median		0.83
Arithmetic Mean		0.88
Passenger		
	Alaska Air Group, Inc.	1.50
	Allegiant Travel Company	1.35
	American Airlines Group	1.60
	Copa Holdings, S.A.	1.50
	Delta Air Lines, Inc.	1.55
	JetBlue Airways Corp.	1.70
	SkyWest, Inc.	1.60
	Southwest Airlines	1.10
	Spirit Airlines, Inc.	1.75
	United Airlines Holdings, Inc.	1.65
Median		1.58
Arithmetic Mean		1.53

Value Line Investment Survey, November 2022 through January 2023

Beta

Industry	*Company*	*Value Line Levered Beta*
Airlines, Value Line		
	Air Transport Services Group	0.80
	Alaska Air Group, Inc.	1.50
	Allegiant Travel Company	1.35
	American Airlines Group	1.60
	Atlas Air Worldwide Holdings	0.75
	Copa Holdings, S.A.	1.50
	Delta Air Lines, Inc.	1.55
	FedEx Corp.	1.10
	JetBlue Airways Corp.	1.70
	SkyWest, Inc.	1.60
	Southwest Airlines	1.10
	Spirit Airlines, Inc.	1.75
	United Airlines Holdings, Inc.	1.65
	United Parcel Service, Inc.	0.85
Median		1.50
Arithmetic Mean		1.34

Value Line Investment Survey, November 2022 through January 2023

Mergent 2022 Corporate Bond Yield Averages

	Corporate by Groups		*Public Utility Bonds*			*Industrial Bonds*			
Month	***Public Utility***	***Industrial***	***Aa***	***A***	***Baa***	***Aaa***	***Aa***	***A***	***Baa***
January	3.25%	3.46%	3.19%	3.33%	3.57%	2.93%	2.83%	3.17%	3.59%
February	3.48%	3.73%	3.56%	3.68%	3.95%	3.25%	3.16%	3.52%	3.99%
March	4.02%	3.74%	3.81%	3.98%	4.28%	3.43%	3.43%	3.77%	4.30%
April	4.34%	4.09%	4.10%	4.32%	4.61%	3.76%	3.76%	4.13%	4.70%
May	4.79%	4.50%	4.55%	4.75%	5.07%	4.13%	4.17%	4.55%	5.16%
June	4.91%	4.64%	4.65%	4.86%	5.22%	4.24%	4.32%	4.68%	5.31%
July	4.84%	4.51%	4.57%	4.78%	5.15%	4.06%	4.16%	4.55%	5.27%
August	4.80%	4.49%	4.54%	4.76%	5.09%	4.07%	4.17%	4.53%	5.21%
September	5.33%	5.03%	5.08%	5.28%	5.61%	4.59%	4.66%	5.08%	5.77%
October	5.91%	5.53%	5.68%	5.88%	6.18%	5.10%	5.11%	5.59%	6.33%
November	5.78%	5.32%	5.54%	5.75%	6.05%	4.90%	4.92%	5.40%	6.08%
December	5.30%	4.87%	5.06%	5.28%	5.57%	4.43%	4.48%	4.94%	5.61%
	4.73%	4.49%	4.53%	4.72%	5.03%	4.07%	4.10%	4.49%	5.11%

Electric Industry

2023 Capitalization Rate Study
Electric Industry Notes

- From the Electric Industry segment, Fortis, Inc. was excluded as Value Line reports all figures in Canadian dollars.

- Staff considered capitalization studies and/or information submitted by:

    No Submissions

- Staff relied upon the results of the following models and appraisal judgment in the development of equity rates:

    1. Discounted Cash Flows
    2. Capital Asset Pricing Model, Ex-Post and Ex-Ante
    3. Earnings/Price Ratio

Industry Capitalization Rate

Industry	*Equity Rate*	*Market Capitalization*	*Long Term Debt*	*Capitalization Rate*
Electric	10.35%	59.40%	40.60%	8.19%

Mergent 2022 Twelve Month Bond Yield Averages

Industry Equity Rate Summary

Electric

CapM Ex Post Equity Rate	10.26%
CapM Ex Ante Equity Rate	11.41%
DCF (Dividend) Equity Rate	8.94%
DCF (Earnings) Equity Rate	9.26%
Earnings Price Ratio	6.72%

CapM Equity Rates

Industry	*Ex Post Risk Premium b**	*Ex Ante Risk Premium c**	*Value Line Beta d*	*Ex Post CAPM Equity Rate (((b-3.87%)*d)+3.87%)*	*Ex Ante CAPM Equity Rate (((c-3.87%)*d)+3.87%)*
Electric	11.04%	12.33%	0.89	10.26%	11.41%

b* Risk Free Rate (3.87%) plus Risk Premium Rate (7.17%)
c* Risk Free Rate (3.87%) plus Risk Premium Rate (8.46%)
20-Yr LT Treasury Yield, Value Line Investment Survey, November 2022 through January 2023, Kroll Cost of Capital Navigator

Discounted Cash Flow (Gordon Growth)

Industry	Company	Value Line Strength	Market Capitalization d	Dividend Yield e	Growth Estimate Dividends f	Growth Estimate Earnings g	Equity Rate Dividend (e+f)	Equity Rate Earnings (e+g)
Electric								
	Allete, Inc.	A	3,800,000,000	3.90%	3.50%	6.00%	7.40%	9.90%
	Alliant Energy Corp.	A	14,000,000,000	3.20%	6.00%	6.00%	9.20%	9.20%
	Ameren Corporation	A	23,000,000,000	2.80%	7.00%	6.50%	9.80%	9.30%
	American Electric Power Company, Inc.	A+	48,900,000,000	3.50%	6.00%	6.50%	9.50%	10.00%
	CenterPoint Energy, Inc.	B++	19,400,000,000	2.30%	2.50%	6.50%		8.80%
	CMS Energy Corporation	A	17,600,000,000	3.00%	6.00%	6.50%	9.00%	9.50%
	DTE Energy Company	A	22,300,000,000	3.30%	3.00%	4.50%	6.30%	7.80%
	Entergy Corporation	B++	23,000,000,000	3.80%	5.00%	4.00%	8.80%	7.80%
	Evergy, Inc.	B++	13,500,000,000	4.20%	7.00%	7.50%	11.20%	11.70%
	OGE Energy Corp.	A	8,000,000,000	4.20%	3.00%	6.50%	7.20%	10.70%
	Otter Tail Corporation	A	2,400,000,000	2.90%	7.00%	4.50%	9.90%	7.40%
	WEC Energy Group, Inc.	A+	30,500,000,000	3.00%	7.00%	6.00%	10.00%	9.00%
Median			18,500,000,000				9.20%	9.25%
Arithmetic Mean			18,866,666,667				8.94%	9.26%

Value Line Investment Survey, November 2022 through January 2023

E/P Ratio

Industry	Company	Value Line Strength	Market Capitalization c	Recent Price d	Projected Earnings e	E/P Ratio (e/d)
Electric						
	Allete, Inc.	A	3,800,000,000	66.34	4.75	7.16%
	Alliant Energy Corp.	A	14,000,000,000	55.78	3.50	6.27%
	Ameren Corporation	A	23,000,000,000	87.94	5.25	5.97%
	American Electric Power Company, Inc.	A+	48,900,000,000	95.22	6.50	6.83%
	CenterPoint Energy, Inc.	B++	19,400,000,000	30.86	1.80	5.83%
	CMS Energy Corporation	A	17,600,000,000	60.80	3.75	6.17%
	DTE Energy Company	A	22,300,000,000	115.30	7.50	6.50%
	Entergy Corporation	B++	23,000,000,000	113.25	8.50	7.51%
	Evergy, Inc.	B++	13,500,000,000	58.69	4.75	8.09%
	OGE Energy Corp.	A	8,000,000,000	39.75	3.25	8.18%
	Otter Tail Corporation	A	2,400,000,000	57.42	3.75	6.53%
	WEC Energy Group, Inc.	A+	30,500,000,000	97.54	5.50	5.64%
Median			18,500,000,000			6.52%
Arithmetic Mean			18,866,666,667			6.72%

Value Line Investment Survey, November 2022 through January 2023

Capital Structure

Industry	*Company*	*Value Line Strength*	*Market Capitalization c*	*Long Term Debt d*	*Debt/Equity Ratio (d/c)*	*Percentage Equity (c/(c+d))*	*Percentage Debt (d/(c+d))*
Electric							
	Allete, Inc.	A	3,800,000,000	1,653,000,000	0.44	69.69%	30.31%
	Alliant Energy Corp.	A	14,000,000,000	7,570,000,000	0.54	64.90%	35.10%
	Ameren Corporation	A	23,000,000,000	13,577,000,000	0.59	62.88%	37.12%
	American Electric Power Company, Inc.	A+	48,900,000,000	33,647,000,000	0.69	59.24%	40.76%
	CenterPoint Energy, Inc.	B++	19,400,000,000	13,435,000,000	0.69	59.08%	40.92%
	CMS Energy Corporation	A	17,600,000,000	12,685,000,000	0.72	58.11%	41.89%
	DTE Energy Company	A	22,300,000,000	17,442,000,000	0.78	56.11%	43.89%
	Entergy Corporation	B++	23,000,000,000	24,635,000,000	1.07	48.28%	51.72%
	Evergy, Inc.	B++	13,500,000,000	9,197,200,000	0.68	59.48%	40.52%
	OGE Energy Corp.	A	8,000,000,000	3,548,000,000	0.44	69.28%	30.72%
	Otter Tail Corporation	A	2,400,000,000	823,800,000	0.34	74.45%	25.55%
	WEC Energy Group, Inc.	A+	30,500,000,000	14,910,700,000	0.49	67.16%	32.84%
Median			18,500,000,000	13,060,000,000	0.64	61.18%	38.82%
Arithmetic Mean			18,866,666,667	12,760,308,333	0.62	62.39%	37.61%
Weighted Average			26,613,604,240	18,191,815,239		59.40%	40.60%

Value Line Investment Survey, November 2022 through January 2023

Beta

Industry	*Company*	*Value Line Levered Beta*
Electric, Selected Comparables		
	Allete, Inc.	0.90
	Alliant Energy Corp.	0.85
	Ameren Corporation	0.85
	American Electric Power Company, Inc.	0.75
	CenterPoint Energy, Inc.	1.10
	CMS Energy Corporation	0.80
	DTE Energy Company	0.95
	Entergy Corporation	0.95
	Evergy, Inc.	0.90
	OGE Energy Corp.	1.00
	Otter Tail Corporation	0.85
	WEC Energy Group, Inc.	0.80
Median		0.88
Arithmetic Mean		0.89

Value Line Investment Survey, November 2022 through January 2023

Beta

Industry	*Company*	*Value Line Levered Beta*
Electric, Value Line		
	Allete, Inc.	0.90
	Alliant Energy Corp.	0.85
	Ameren Corporation	0.85
	American Electric Power Company, Inc.	0.75
	CenterPoint Energy, Inc.	1.10
	CMS Energy Corporation	0.80
	DTE Energy Company	0.95
	Entergy Corporation	0.95
	Evergy, Inc.	0.90
	Fortis Inc.	0.70
	OGE Energy Corp.	1.00
	Otter Tail Corporation	0.85
	WEC Energy Group, Inc.	0.80
Median		0.85
Arithmetic Mean		0.88

Value Line Investment Survey, November 2022 through January 2023

Mergent 2022 Corporate Bond Yield Averages

	Corporate by Groups		Public Utility Bonds			Industrial Bonds			
Month	***Public Utility***	***Industrial***	***Aa***	***A***	***Baa***	***Aaa***	***Aa***	***A***	***Baa***
January	3.25%	3.46%	3.19%	3.33%	3.57%	2.93%	2.83%	3.17%	3.59%
February	3.48%	3.73%	3.56%	3.68%	3.95%	3.25%	3.16%	3.52%	3.99%
March	4.02%	3.74%	3.81%	3.98%	4.28%	3.43%	3.43%	3.77%	4.30%
April	4.34%	4.09%	4.10%	4.32%	4.61%	3.76%	3.76%	4.13%	4.70%
May	4.79%	4.50%	4.55%	4.75%	5.07%	4.13%	4.17%	4.55%	5.16%
June	4.91%	4.64%	4.65%	4.86%	5.22%	4.24%	4.32%	4.68%	5.31%
July	4.84%	4.51%	4.57%	4.78%	5.15%	4.06%	4.16%	4.55%	5.27%
August	4.80%	4.49%	4.54%	4.76%	5.09%	4.07%	4.17%	4.53%	5.21%
September	5.33%	5.03%	5.08%	5.28%	5.61%	4.59%	4.66%	5.08%	5.77%
October	5.91%	5.53%	5.68%	5.88%	6.18%	5.10%	5.11%	5.59%	6.33%
November	5.78%	5.32%	5.54%	5.75%	6.05%	4.90%	4.92%	5.40%	6.08%
December	5.30%	4.87%	5.06%	5.28%	5.57%	4.43%	4.48%	4.94%	5.61%
	4.73%	4.49%	4.53%	4.72%	5.03%	4.07%	4.10%	4.49%	5.11%

Fluid
Pipelines
Industry

2023 Capitalization Rate Study
Fluid Pipeline (Petroleum Integrated) Industry Notes

- From the Fluid Pipeline (Petroleum Integrated) Industry segment, Petroleo Brasileiro S.A. was excluded. While publicly traded, the Brazilian Government is a majority holder of the common stock. Cenovus Energy Inc. and Suncor Energy, Inc. were excluded as Value Line reports all figures in Canadian dollars.

- Staff considered capitalization studies and/or information submitted by:

  Nielsen Management Services - Liquids Pipeline Industry Capitalization Rate Study

- Staff relied upon the results of the following models and appraisal judgment in the development of equity rates:

  1. Discounted Cash Flows
  2. Capital Asset Pricing Model, Ex-Post and Ex-Ante
  3. Earnings/Price Ratio

Industry Capitalization Rate

Industry	*Equity Rate*	*Market Capitalization*	*Long Term Debt*	*Capitalization Rate*
Fluid Pipelines (Petroleum Integrated)	14.75%	88.52%	11.48%	13.64%

Mergent 2022 Twelve Month Bond Yield Averages

Industry Equity Rate Summary

Fluid Pipelines (Petroleum Integrated)

CapM Ex Post Equity Rate	13.69%
CapM Ex Ante Equity Rate	15.46%
DCF (Dividend) Equity Rate	9.68%
DCF (Earnings) Equity Rate	41.91%
Earnings Price Ratio	10.52%

CapM Equity Rates

Industry	*Ex Post Risk Premium b**	*Ex Ante Risk Premium c**	*Value Line Beta d*	*Ex Post CAPM Equity Rate (((b-3.87%)*d)+3.87%)*	*Ex Ante CAPM Equity Rate (((c-3.87%)*d)+3.87%)*
Fluid Pipelines (Petroleum Integrated)	11.04%	12.33%	1.37	13.69%	15.46%

b* Risk Free Rate (3.87%) plus Risk Premium Rate (7.17%)
c* Risk Free Rate (3.87%) plus Risk Premium Rate (8.46%)
20-Yr LT Treasury Yield, Value Line Investment Survey, November 2022 through January 2023, Kroll Cost of Capital Navigator

Discounted Cash Flow (Gordon Growth)

Industry	Company	Value Line Strength	Market Capitalization d	Dividend Yield e	Growth Estimate Dividends f	Growth Estimate Earnings g	Equity Rate Dividend (e+f)	Equity Rate Earnings (e+g)
Fluid Pipelines (Petroleum Integrated)								
	BP p.l.c.	B+	104,000,000,000	4.30%	-0.50%	0.00%		
	CVR Energy, Inc.	B	4,000,000,000	4.00%	2.00%	38.00%	6.00%	42.00%
	Chevron Corp.	A	361,000,000,000	3.10%	4.00%	45.00%	7.10%	48.10%
	Delek US Holdings, Inc.	B	2,300,000,000	2.50%	6.50%	0.00%	9.00%	
	Exxon Mobil Corp.	A	467,000,000,000	3.20%	1.00%	0.00%		
	Hess Corporation	A	44,900,000,000	1.00%	12.50%	0.00%	13.50%	
	HF Sinclair Corporation	B+	12,600,000,000	2.50%	16.00%	40.00%	18.50%	42.50%
	Imperial Oil Ltd.	B+	35,400,000,000	2.50%	12.00%	34.00%	14.50%	36.50%
	Marathon Petroleum	B+	56,500,000,000	2.50%	6.50%	0.00%	9.00%	
	Murphy Oil Corp.	B	7,600,000,000	2.00%	9.00%	0.00%	11.00%	
	Occidental Petroleum	B++	66,600,000,000	1.00%	8.00%	0.00%	9.00%	
	PBF Energy, Inc.	C++	5,700,000,000	1.70%	8.00%	0.00%	9.70%	
	Phillips 66	A	52,100,000,000	3.60%	5.00%	85.00%	8.60%	88.60%
	Shell plc	B++	201,000,000,000	3.70%	2.00%	35.50%	5.70%	39.20%
	TotalEnergies SE	B++	148,000,000,000	5.50%	3.00%	19.00%	8.50%	24.50%
	Valero Energy Corp.	B+	52,700,000,000	2.90%	2.50%	11.00%	5.40%	13.90%
Median			52,400,000,000				9.00%	40.60%
Arithmetic Mean			101,337,500,000				9.68%	41.91%

Value Line Investment Survey, November 2022 through January 2023

E/P Ratio

Industry	Company	Value Line Strength	Market Capitalization c	Recent Price d	Projected Earnings e	E/P Ratio (e/d)
Fluid Pipelines (Petroleum Integrated)						
	BP p.l.c.	B+	104,000,000,000	33.55	5.25	15.65%
	CVR Energy, Inc.	B	4,000,000,000	39.67	3.45	8.70%
	Chevron Corp.	A	361,000,000,000	186.55	21.00	11.26%
	Delek US Holdings, Inc.	B	2,300,000,000	33.10	2.65	8.01%
	Exxon Mobil Corp.	A	467,000,000,000	113.37	6.00	5.29%
	Hess Corporation	A	44,900,000,000	145.51	7.50	5.15%
	HF Sinclair Corporation	B+	12,600,000,000	62.82	14.00	22.29%
	Imperial Oil Ltd.	B+	35,400,000,000	56.62	7.40	13.07%
	Marathon Petroleum	B+	56,500,000,000	120.53	9.35	7.76%
	Murphy Oil Corp.	B	7,600,000,000	49.00	6.75	13.78%
	Occidental Petroleum	B++	66,600,000,000	73.28	6.75	9.21%
	PBF Energy, Inc.	C++	5,700,000,000	46.78	3.85	8.23%
	Phillips 66	A	52,100,000,000	110.26	9.60	8.71%
	Shell plc	B++	201,000,000,000	54.66	7.25	13.26%
	TotalEnergies SE	B++	148,000,000,000	58.05	6.85	11.80%
	Valero Energy Corp.	B+	52,700,000,000	136.80	8.50	6.21%
Median			52,400,000,000			8.96%
Arithmetic Mean			101,337,500,000			10.52%

Value Line Investment Survey, November 2022 through January 2023

Capital Structure

Industry	Company	Value Line Strength	Market Capitalization c	Long Term Debt d	Debt/Equity Ratio (d/c)	Percentage Equity (c/(c+d))	Percentage Debt (d/(c+d))
Fluid Pipelines (Petroleum Integrated)							
	BP p.l.c.	B+	104,000,000,000	42,700,000,000	0.41	70.89%	29.11%
	CVR Energy, Inc.	B	4,000,000,000	1,587,000,000	0.40	71.59%	28.41%
	Chevron Corp.	A	361,000,000,000	21,420,000,000	0.06	94.40%	5.60%
	Delek US Holdings, Inc.	B	2,300,000,000	2,671,000,000	1.16	46.27%	53.73%
	Exxon Mobil Corp.	A	467,000,000,000	39,246,000,000	0.08	92.25%	7.75%
	Hess Corporation	A	44,900,000,000	8,949,000,000	0.20	83.38%	16.62%
	HF Sinclair Corporation	B+	12,600,000,000	3,334,200,000	0.26	79.08%	20.92%
	Imperial Oil Ltd.	B+	35,400,000,000	2,947,000,000	0.08	92.31%	7.69%
	Marathon Petroleum	B+	56,500,000,000	25,638,000,000	0.45	68.79%	31.21%
	Murphy Oil Corp.	B	7,600,000,000	2,023,000,000	0.27	78.98%	21.02%
	Occidental Petroleum	B++	66,600,000,000	20,478,000,000	0.31	76.48%	23.52%
	PBF Energy, Inc.	C++	5,700,000,000	1,448,000,000	0.25	79.74%	20.26%
	Phillips 66	A	52,100,000,000	16,625,000,000	0.32	75.81%	24.19%
	Shell plc	B++	201,000,000,000	73,900,000,000	0.37	73.12%	26.88%
	TotalEnergies SE	B++	148,000,000,000	44,900,000,000	0.30	76.72%	23.28%
	Valero Energy Corp.	B+	52,700,000,000	10,570,000,000	0.20	83.29%	16.71%
Median			52,400,000,000	13,597,500,000	0.28	77.85%	22.15%
Arithmetic Mean			101,337,500,000	19,902,262,500	0.32	77.69%	22.31%
Weighted Average			270,254,089,059	35,043,943,395		88.52%	11.48%

Value Line Investment Survey, November 2022 through January 2023

Beta

Industry	Company	Value Line Levered Beta
Fluid Pipelines (Petroleum Integrated), Selected Comparables		
	BP p.l.c.	1.25
	CVR Energy, Inc.	
	Chevron Corp.	1.20
	Delek US Holdings, Inc.	1.30
	Exxon Mobil Corp.	1.10
	Hess Corporation	1.35
	HF Sinclair Corporation	1.25
	Imperial Oil Ltd.	1.35
	Marathon Petroleum	1.55
	Murphy Oil Corp.	1.65
	Occidental Petroleum	1.55
	PBF Energy, Inc.	1.80
	Phillips 66	1.30
	Shell plc	1.25
	TotalEnergies SE	1.15
	Valero Energy Corp.	1.50
Median		1.30
Arithmetic Mean		1.37

Value Line Investment Survey, November 2022 through January 2023

Beta

Industry	Company	Value Line Levered Beta
Fluid Pipelines (Petroleum Integrated), Value Line		
	BP p.l.c.	1.25
	CVR Energy, Inc.	
	Cenovus Energy Inc.	1.45
	Chevron Corp.	1.20
	Delek US Holdings, Inc.	1.30
	Exxon Mobil Corp.	1.10
	Hess Corporation	1.35
	HF Sinclair Corporation	1.25
	Imperial Oil Ltd.	1.35
	Marathon Petroleum	1.55
	Murphy Oil Corp.	1.65
	Occidental Petroleum	1.55
	PBF Energy, Inc.	1.80
	Petroleo Brasileiro S.A. (Petrobas)	1.35
	Phillips 66	1.30
	Shell plc	1.25
	Suncor Energy Inc.	1.30
	TotalEnergies SE	1.15
	Valero Energy Corp.	1.50
Median		1.33
Arithmetic Mean		1.37

Value Line Investment Survey, November 2022 through January 2023

Mergent 2022 Corporate Bond Yield Averages

	Corporate by Groups		*Public Utility Bonds*			*Industrial Bonds*			
Month	***Public Utility***	***Industrial***	***Aa***	***A***	***Baa***	***Aaa***	***Aa***	***A***	***Baa***
January	3.25%	3.46%	3.19%	3.33%	3.57%	2.93%	2.83%	3.17%	3.59%
February	3.48%	3.73%	3.56%	3.68%	3.95%	3.25%	3.16%	3.52%	3.99%
March	4.02%	3.74%	3.81%	3.98%	4.28%	3.43%	3.43%	3.77%	4.30%
April	4.34%	4.09%	4.10%	4.32%	4.61%	3.76%	3.76%	4.13%	4.70%
May	4.79%	4.50%	4.55%	4.75%	5.07%	4.13%	4.17%	4.55%	5.16%
June	4.91%	4.64%	4.65%	4.86%	5.22%	4.24%	4.32%	4.68%	5.31%
July	4.84%	4.51%	4.57%	4.78%	5.15%	4.06%	4.16%	4.55%	5.27%
August	4.80%	4.49%	4.54%	4.76%	5.09%	4.07%	4.17%	4.53%	5.21%
September	5.33%	5.03%	5.08%	5.28%	5.61%	4.59%	4.66%	5.08%	5.77%
October	5.91%	5.53%	5.68%	5.88%	6.18%	5.10%	5.11%	5.59%	6.33%
November	5.78%	5.32%	5.54%	5.75%	6.05%	4.90%	4.92%	5.40%	6.08%
December	5.30%	4.87%	5.06%	5.28%	5.57%	4.43%	4.48%	4.94%	5.61%
	4.73%	4.49%	4.53%	4.72%	5.03%	4.07%	4.10%	4.49%	5.11%

Gas Distribution Industry

2023 Capitalization Rate Study
Gas Distribution (Natural Gas Utility) Industry Notes

- From the Natural Gas Utility Industry segment, UGI Corp. was excluded as they presented to primarily market propane gas.

- Staff considered capitalization studies and/or information submitted by:

  K.E. Andrews & Co. – Oil Gas Storage and Transportation: Natural Gas Transmission and & Distribution Industry
  Nielsen Management Services, LLC – Natural Gas Pipeline Industry

- Staff relied upon the results of the following models and appraisal judgment in the development of equity rates:

  1. Discounted Cash Flow
  2. Capital Asset Pricing Model, Ex-Post and Ex-Ante
  3. Earnings/Price Ratio

Industry Capitalization Rate

Industry	*Equity Rate*	*Market Capitalization*	*Long Term Debt*	*Capitalization Rate*
Gas Distribution (Natural Gas Utility)	11.00%	62.57%	37.43%	8.77%

Mergent 2022 Twelve Month Bond Yield Averages

Industry Equity Rate Summary

Gas Distribution (Natural Gas Utility)

CapM Ex Post Equity Rate	9.96%
CapM Ex Ante Equity Rate	11.06%
DCF (Dividend) Equity Rate	9.11%
DCF (Earnings) Equity Rate	11.44%
Earnings Price Ratio	7.18%

CapM Equity Rates

Industry	*Ex Post Risk Premium b**	*Ex Ante Risk Premium c**	*Value Line Beta d*	*Ex Post CAPM Equity Rate (((b-3.87%)*d)+3.87%)*	*Ex Ante CAPM Equity Rate (((c-3.87%)*d)+3.87%)*
Gas Distribution (Natural Gas Utility)	11.04%	12.33%	0.85	9.96%	11.06%

b* Risk Free Rate (3.87%) plus Risk Premium Rate (7.17%)

c* Risk Free Rate (3.87%) plus Risk Premium Rate (8.46%)

20-Yr LT Treasury Yield, Value Line Investment Survey, November 2022 through January 2023, Kroll Cost of Capital Navigator

Discounted Cash Flow (Gordon Growth)

Industry	Company	Value Line Strength	Market Capitalization d	Dividend Yield e	Growth Estimate Dividends f	Growth Estimate Earnings g	Equity Rate Dividend (e+f)	Equity Rate Earnings (e+g)
Gas Distribution (Natural Gas Utility)								
	Atmos Energy Corporation	A+	15,500,000,000	2.70%	7.00%	7.50%	9.70%	10.20%
	Chesapeake Utilities Corporation	A	2,000,000,000	2.00%	8.50%	7.50%	10.50%	9.50%
	New Jersey Resources Corp.	A+	4,300,000,000	3.50%	5.00%	5.00%	8.50%	8.50%
	NiSource Inc.	B+	10,500,000,000	3.80%	4.50%	9.50%	8.30%	13.30%
	Northwest Natural Holding Co.	A	1,700,000,000	4.10%	0.50%	6.50%		10.60%
	ONE Gas, Inc.	B++	4,400,000,000	3.20%	6.50%	6.50%	9.70%	9.70%
	South Jersey Industries, Inc.	B++	4,200,000,000	3.70%	4.00%	10.50%	7.70%	14.20%
	Southwest Gas Holdings, Inc.	A	4,300,000,000	3.90%	5.50%	10.00%	9.40%	13.90%
	Spire Inc.	B++	3,700,000,000	4.10%	5.00%	9.00%	9.10%	13.10%
Median			4,300,000,000				9.25%	10.60%
Arithmetic Mean			5,622,222,222				9.11%	11.44%

Value Line Investment Survey, November 2022 through January 2023

E/P Ratio

Industry	*Company*	*Value Line Strength*	*Market Capitalization c*	*Recent Price d*	*Projected Earnings e*	*E/P Ratio (e/d)*
Gas Distribution (Natural Gas Utility)						
	Atmos Energy Corporation	A+	15,500,000,000	110.53	7.30	6.60%
	Chesapeake Utilities Corporation	A	2,000,000,000	110.41	6.50	5.89%
	New Jersey Resources Corp.	A+	4,300,000,000	44.45	2.90	6.52%
	NiSource Inc.	B+	10,500,000,000	25.76	2.10	8.15%
	Northwest Natural Holding Co.	A	1,700,000,000	47.49	3.30	6.95%
	ONE Gas, Inc.	B++	4,400,000,000	81.47	5.30	6.51%
	South Jersey Industries, Inc.	B++	4,200,000,000	33.99	2.40	7.06%
	Southwest Gas Holdings, Inc.	A	4,300,000,000	63.38	5.75	9.07%
	Spire Inc.	B++	3,700,000,000	69.55	5.50	7.91%
Median			4,300,000,000			6.95%
Arithmetic Mean			5,622,222,222			7.18%

Value Line Investment Survey, November 2022 through January 2023

Capital Structure

Industry	Company	Value Line Strength	Market Capitalization c	Long Term Debt d	Debt/Equity Ratio (d/c)	Percentage Equity (c/(c+d))	Percentage Debt (d/(c+d))
Gas Distribution (Natural Gas Utility)							
	Atmos Energy Corporation	A+	15,500,000,000	5,759,200,000	0.37	72.91%	27.09%
	Chesapeake Utilities Corporation	A	2,000,000,000	583,800,000	0.29	77.41%	22.59%
	New Jersey Resources Corp.	A+	4,300,000,000	2,524,600,000	0.59	63.01%	36.99%
	NiSource Inc.	B+	10,500,000,000	9,521,200,000	0.91	52.44%	47.56%
	Northwest Natural Holding Co.	A	1,700,000,000	1,287,000,000	0.76	56.91%	43.09%
	ONE Gas, Inc.	B++	4,400,000,000	2,429,100,000	0.55	64.43%	35.57%
	South Jersey Industries, Inc.	B++	4,200,000,000	3,566,800,000	0.85	54.08%	45.92%
	Southwest Gas Holdings, Inc.	A	4,300,000,000	5,866,000,000	1.36	42.30%	57.70%
	Spire Inc.	B++	3,700,000,000	3,207,900,000	0.87	53.56%	46.44%
Median			4,300,000,000	3,207,900,000	0.76	56.91%	43.09%
Arithmetic Mean			5,622,222,222	3,860,622,222	0.73	59.67%	40.33%
Weighted Average			8,795,652,174	5,261,128,656		62.57%	37.43%

Value Line Investment Survey, November 2022 through January 2023

Beta

Industry	Company	Value Line Levered Beta
Gas Distribution (Natural Gas Utility), Selected Comparables		
	Atmos Energy Corporation	0.80
	Chesapeake Utilities Corporation	0.80
	New Jersey Resources Corp.	0.95
	NiSource Inc.	0.85
	Northwest Natural Holding Co.	0.80
	ONE Gas, Inc.	0.80
	South Jersey Industries, Inc.	0.90
	Southwest Gas Holdings, Inc.	0.90
	Spire Inc.	0.85
Median		0.85
Arithmetic Mean		0.85
Gas Distribution (Natural Gas Utility), Value Line		
	Atmos Energy Corporation	0.80
	Chesapeake Utilities Corporation	0.80
	New Jersey Resources Corp.	0.95
	NiSource Inc.	0.85
	Northwest Natural Holding Co.	0.80
	ONE Gas, Inc.	0.80
	South Jersey Industries, Inc.	0.90
	Southwest Gas Holdings, Inc.	0.90
	Spire Inc.	0.85
	UGI Corp.	1.05
Median		0.85
Arithmetic Mean		0.87

Value Line Investment Survey, November 2022 through January 2023

Mergent 2022 Corporate Bond Yield Averages

	Corporate by Groups		*Public Utility Bonds*			*Industrial Bonds*			
Month	***Public Utility***	***Industrial***	***Aa***	***A***	***Baa***	***Aaa***	***Aa***	***A***	***Baa***
January	3.25%	3.46%	3.19%	3.33%	3.57%	2.93%	2.83%	3.17%	3.59%
February	3.48%	3.73%	3.56%	3.68%	3.95%	3.25%	3.16%	3.52%	3.99%
March	4.02%	3.74%	3.81%	3.98%	4.28%	3.43%	3.43%	3.77%	4.30%
April	4.34%	4.09%	4.10%	4.32%	4.61%	3.76%	3.76%	4.13%	4.70%
May	4.79%	4.50%	4.55%	4.75%	5.07%	4.13%	4.17%	4.55%	5.16%
June	4.91%	4.64%	4.65%	4.86%	5.22%	4.24%	4.32%	4.68%	5.31%
July	4.84%	4.51%	4.57%	4.78%	5.15%	4.06%	4.16%	4.55%	5.27%
August	4.80%	4.49%	4.54%	4.76%	5.09%	4.07%	4.17%	4.53%	5.21%
September	5.33%	5.03%	5.08%	5.28%	5.61%	4.59%	4.66%	5.08%	5.77%
October	5.91%	5.53%	5.68%	5.88%	6.18%	5.10%	5.11%	5.59%	6.33%
November	5.78%	5.32%	5.54%	5.75%	6.05%	4.90%	4.92%	5.40%	6.08%
December	5.30%	4.87%	5.06%	5.28%	5.57%	4.43%	4.48%	4.94%	5.61%
	4.73%	4.49%	4.53%	4.72%	5.03%	4.07%	4.10%	4.49%	5.11%

Gas Transmission Industry

2023 Capitalization Rate Study
Gas Transmission Industry Notes

- Recognizing the Natural Gas Diversified Industry segment and Oil/Gas Distribution Industry segment from Value Line.

- From the Natural Gas Diversified Industry segment, National Fuel Gas Company and Targa Resources were included as they presented to be primarily engaged in the transportation of natural gas.

- From the Oil/Gas Distribution Industry segment, EnLink Midstream, LLC, Kinder Morgan, Inc., ONEOK, Inc., TC Energy Corp., and The Williams Companies, Inc. were included as they presented to be primarily engaged in the transportation of natural gas.

- Staff considered capitalization studies and/or information submitted by:

  K.E. Andrews & Co. – Oil & Gas Storage and Transportation: Natural Gas Transmission & Distribution Industry
  K.E. Andrews & Co. – Southern Star Central Gas Pipeline, Inc.
  Nielsen Management Services, LLC – Natural Gas Pipeline Industry

- Staff relied upon the results of the following models and appraisal judgment in the development of equity rates:

  1. Discounted Cash Flow
  2. Capital Asset Pricing Model, Ex-Post and Ex-Ante
  3. Earnings/Price Ratio

Industry Capitalization Rate

Industry	***Equity Rate***	***Market Capitalization***	***Long Term Debt***	***Capitalization Rate***
Gas Transmission	15.35%	60.53%	39.47%	11.31%

Mergent 2022 Twelve Month Bond Yield Averages

Industry Equity Rate Summary

Gas Transmission

CapM Ex Post Equity Rate	12.88%
CapM Ex Ante Equity Rate	14.51%
DCF (Dividend) Equity Rate	10.15%
DCF (Earnings) Equity Rate	20.38%
Earnings Price Ratio	8.54%

CapM Equity Rates

Industry	*Ex Post Risk Premium b**	*Ex Ante Risk Premium c**	*Value Line Beta d*	*Ex Post CAPM Equity Rate (((b-3.87%)*d)+3.87%)*	*Ex Ante CAPM Equity Rate (((c-3.87%)*d)+3.87%)*
Gas Transmission	11.04%	12.33%	1.26	12.88%	14.51%

b* Risk Free Rate (3.87%) plus Risk Premium Rate (7.17%)
c* Risk Free Rate (3.87%) plus Risk Premium Rate (8.46%)
20-Yr LT Treasury Yield, Value Line Investment Survey, November 2022 through January 2023, Kroll Cost of Capital Navigator

Discounted Cash Flow (Gordon Growth)

Industry	Company	Value Line Strength	Market Capitalization d	Dividend Yield e	Growth Estimate Dividends f	Growth Estimate Earnings g	Equity Rate Dividend (e+f)	Equity Rate Earnings (e+g)
Gas Transmission (Natural Gas Diversified)								
	EnLink Midstream, LLC	C+	5,700,000,000	3.90%	-6.00%	0.00%		
	Kinder Morgan, Inc.	B	41,700,000,000	6.00%	6.50%	19.00%	12.50%	25.00%
	Natural Fuel Gas Company	B+	5,900,000,000	3.00%	4.00%	25.00%	7.00%	28.00%
	ONEOK, Inc.	B+	28,800,000,000	6.30%	4.50%	11.50%	10.80%	17.80%
	Targa Resources	C++	16,300,000,000	2.50%	8.00%	0.00%	10.50%	
	TC Energy Corp.	B++	48,000,000,000	6.10%	4.00%	8.00%	10.10%	14.10%
	The Williams Companies, Inc.	B	41,100,000,000	5.00%	5.00%	12.00%	10.00%	17.00%
Median			28,800,000,000				10.30%	17.80%
Arithmetic Mean			26,785,714,286				10.15%	20.38%

Value Line Investment Survey, November 2022 through January 2023

E/P Ratio

Industry	Company	Value Line Strength	Market Capitalization c	Recent Price d	Projected Earnings e	E/P Ratio (e/d)
Gas Transmission (Natural Gas Diversified)						
	EnLink Midstream, LLC	C+	5,700,000,000	12.11	0.85	7.02%
	Kinder Morgan, Inc.	B	41,700,000,000	18.53	1.70	9.17%
	Natural Fuel Gas Company	B+	5,900,000,000	64.09	7.80	12.17%
	ONEOK, Inc.	B+	28,800,000,000	64.38	5.80	9.01%
	Targa Resources	C++	16,300,000,000	71.91	4.40	6.12%
	TC Energy Corp.	B++	48,000,000,000	47.41	4.50	9.49%
	The Williams Companies, Inc.	B	41,100,000,000	33.77	2.30	6.81%
Median			28,800,000,000			9.01%
Arithmetic Mean			26,785,714,286			$\boxed{8.54\%}$

Value Line Investment Survey, November 2022 through January 2023

Capital Structure

Industry	Company	Value Line Strength	Market Capitalization c	Long Term Debt d	Debt/Equity Ratio (d/c)	Percentage Equity (c/(c+d))	Percentage Debt (d/(c+d))
Gas Transmission (Natural Gas Diversified)							
	EnLink Midstream, LLC	C+	5,700,000,000	4,320,000,000	0.76	56.89%	43.11%
	Kinder Morgan, Inc.	B	41,700,000,000	29,100,000,000	0.70	58.90%	41.10%
	Natural Fuel Gas Company	B+	5,900,000,000	2,082,400,000	0.35	73.91%	26.09%
	ONEOK, Inc.	B+	28,800,000,000	11,950,700,000	0.41	70.67%	29.33%
	Targa Resources	C++	16,300,000,000	10,431,300,000	0.64	60.98%	39.02%
	TC Energy Corp.	B++	48,000,000,000	37,617,500,000	0.78	56.06%	43.94%
	The Williams Companies, Inc.	B	41,100,000,000	22,530,000,000	0.55	64.59%	35.41%
Median			28,800,000,000	11,950,700,000	0.64	60.98%	39.02%
Arithmetic Mean			26,785,714,286	16,861,700,000	0.60	63.14%	36.86%
Weighted Average			36,770,826,667	23,979,805,387		60.53%	39.47%

Value Line Investment Survey, November 2022 through January 2023

Beta

Industry	Company	Value Line Levered Beta
Gas Transmission (Natural Gas Diversified), Selected Comparables		
	EnLink Midstream, LLC	1.55
	Kinder Morgan, Inc.	1.15
	Natural Fuel Gas Company	0.85
	ONEOK, Inc.	1.45
	Targa Resources	1.60
	TC Energy Corp.	1.05
	The Williams Companies, Inc.	1.15
Median		1.15
Arithmetic Mean		1.26
Gas Transmission (Natural Gas Diversified), Value Line		
	Antero Resources Corporation	1.30
	Brigham Minerals	1.20
	Callon Petroleum	1.95
	CNX Resources Corp.	0.85
	Coterra Energy Inc.	
	Devon Energy Corp.	1.50
	Enerplus Corp.	1.50
	EOG Resources, Inc.	1.20
	EQT Corporation	1.05
	MDU Resources Group, Inc.	1.05
	Natural Fuel Gas Company	0.85
	New Fortress Energy, Inc.	1.30
	Qvintiv Inc.	1.60
	PDC Energy, Inc.	1.45
	Southwestern Energy Company	0.85
	Targa Resources	1.60
Median		1.30
Arithmetic Mean		1.28

Value Line Investment Survey, November 2022 through January 2023

Mergent 2022 Corporate Bond Yield Averages

	Corporate by Groups		Public Utility Bonds			Industrial Bonds			
Month	***Public Utility***	***Industrial***	***Aa***	***A***	***Baa***	***Aaa***	***Aa***	***A***	***Baa***
January	3.25%	3.46%	3.19%	3.33%	3.57%	2.93%	2.83%	3.17%	3.59%
February	3.48%	3.73%	3.56%	3.68%	3.95%	3.25%	3.16%	3.52%	3.99%
March	4.02%	3.74%	3.81%	3.98%	4.28%	3.43%	3.43%	3.77%	4.30%
April	4.34%	4.09%	4.10%	4.32%	4.61%	3.76%	3.76%	4.13%	4.70%
May	4.79%	4.50%	4.55%	4.75%	5.07%	4.13%	4.17%	4.55%	5.16%
June	4.91%	4.64%	4.65%	4.86%	5.22%	4.24%	4.32%	4.68%	5.31%
July	4.84%	4.51%	4.57%	4.78%	5.15%	4.06%	4.16%	4.55%	5.27%
August	4.80%	4.49%	4.54%	4.76%	5.09%	4.07%	4.17%	4.53%	5.21%
September	5.33%	5.03%	5.08%	5.28%	5.61%	4.59%	4.66%	5.08%	5.77%
October	5.91%	5.53%	5.68%	5.88%	6.18%	5.10%	5.11%	5.59%	6.33%
November	5.78%	5.32%	5.54%	5.75%	6.05%	4.90%	4.92%	5.40%	6.08%
December	5.30%	4.87%	5.06%	5.28%	5.57%	4.43%	4.48%	4.94%	5.61%
	4.73%	4.49%	4.53%	4.72%	5.03%	4.07%	4.10%	4.49%	5.11%

Railroad Industry

2023 Capitalization Rate Study
Railroad Industry Notes

- For the Railroad Industry segment, Wabtec was excluded as it provides equipment and services to the rail industry. Trinity Industries, Inc. was excluded as they design and manufacture railcars and component parts. GATX Corp. was excluded as they specialize in tank, freight car, and locomotive leasing. The Greenbrier Companies, Inc. was excluded as they design, manufacture, repair, and market railroad freight cars and related equipment.

- Staff considered capitalization studies and/or information submitted by:

  Union Pacific Railroad Company
  BNSF Railway Company

- Staff relied upon the results of the following models and appraisal judgment in the development of equity rates:

  1. Discounted Cash Flow
  2. Capital Asset Pricing Model, Ex-Post and Ex-Ante
  3. Earnings/Price Ratio

Industry Capitalization Rate

Industry	*Equity Rate*	*Market Capitalization*	*Long Term Debt*	*Capitalization Rate*
Railroad	12.20%	81.68%	18.32%	10.90%

Mergent 2022 Twelve Month Bond Yield Averages

Industry Equity Rate Summary

Railroad

CapM Ex Post Equity Rate	11.11%
CapM Ex Ante Equity Rate	12.41%
DCF (Dividend) Equity Rate	11.04%
DCF (Earnings) Equity Rate	11.94%
Earnings Price Ratio	7.61%

CapM Equity Rates

Industry	*Ex Post Risk Premium b**	*Ex Ante Risk Premium c**	*Value Line Beta d*	*Ex Post CAPM Equity Rate (((b-3.87%)*d)+3.87%)*	*Ex Ante CAPM Equity Rate (((c-3.87%)*d)+3.87%)*
Railroad	11.04%	12.33%	1.01	11.11%	12.41%

b* Risk Free Rate (3.87%) plus Risk Premium Rate (7.17%)
c* Risk Free Rate (3.87%) plus Risk Premium Rate (8.46%)
20-Yr LT Treasury Yield, Value Line Investment Survey, November 2022 through January 2023, Kroll Cost of Capital Navigator

Discounted Cash Flow (Gordon Growth)

Industry	*Company*	*Value Line Strength*	*Market Capitalization d*	*Dividend Yield e*	*Growth Estimate Dividends f*	*Growth Estimate Earnings g*	*Equity Rate Dividend (e+f)*	*Equity Rate Earnings (e+g)*
Railroad								
	Canadian National Railway	A	83,000,000,000	1.90%	10.00%	11.00%	11.90%	12.90%
	Canadian Pacific Railway Limited	A	71,600,000,000	0.80%	10.00%	10.00%	10.80%	10.80%
	CSX Corporation	B++	62,900,000,000	1.30%	9.50%	10.50%	10.80%	11.80%
	Norfolk Southern Corp.	A+	54,600,000,000	2.10%	8.00%	10.00%	10.10%	12.10%
	Union Pacific Corporation	A++	121,000,000,000	2.60%	9.00%	9.50%	11.60%	12.10%
Median			71,600,000,000				10.80%	12.10%
Arithmetic Mean			78,620,000,000				11.04%	11.94%

Value Line Investment Survey, November 2022 through January 2023

E/P Ratio

Industry	Company	Value Line Strength	Market Capitalization c	Recent Price d	Projected Earnings e	E/P Ratio (e/d)
Railroad						
	Canadian National Railway	A	83,000,000,000	120.15	8.40	6.99%
	Canadian Pacific Railway Limited	A	71,600,000,000	77.00	5.40	7.01%
	CSX Corporation	B++	62,900,000,000	29.96	2.50	8.34%
	Norfolk Southern Corp.	A+	54,600,000,000	235.63	19.00	8.06%
	Union Pacific Corporation	A++	121,000,000,000	196.30	15.00	7.64%
Median			71,600,000,000			7.64%
Arithmetic Mean			78,620,000,000			7.61%

Value Line Investment Survey, November 2022 through January 2023

Capital Structure

Industry	Company	Value Line Strength	Market Capitalization c	Long Term Debt d	Debt/Equity Ratio (d/c)	Percentage Equity (c/(c+d))	Percentage Debt (d/(c+d))
Railroad							
	Canadian National Railway	A	83,000,000,000	9,420,000,000	0.11	89.81%	10.19%
	Canadian Pacific Railway Limited	A	71,600,000,000	13,924,000,000	0.19	83.72%	16.28%
	CSX Corporation	B++	62,900,000,000	17,895,000,000	0.28	77.85%	22.15%
	Norfolk Southern Corp.	A+	54,600,000,000	14,463,000,000	0.26	79.06%	20.94%
	Union Pacific Corporation	A++	121,000,000,000	31,744,000,000	0.26	79.22%	20.78%
Median			71,600,000,000	14,463,000,000	0.26	79.22%	20.78%
Arithmetic Mean			78,620,000,000	17,489,200,000	0.22	81.93%	18.07%
Weighted Average			85,459,501,399	19,168,450,013		81.68%	18.32%

Value Line Investment Survey, November 2022 through January 2023

Beta

Industry	*Company*	*Value Line Levered Beta*
Railroad, Selected Comparables		
	Canadian National Railway	0.90
	Canadian Pacific Railway Limited	1.00
	CSX Corporation	1.05
	Norfolk Southern Corp.	1.05
	Union Pacific Corporation	1.05
Median		1.05
Arithmetic Mean		1.01
Railroad, Value Line		
	Canadian National Railway	0.90
	Canadian Pacific Railway Limited	1.00
	CSX Corporation	1.05
	GATX Corp.	0.95
	Norfolk Southern Corp.	1.05
	The Greenbriar Companies, Inc.	1.25
	Trinity Industries Inc.	1.00
	Union Pacific Corporation	1.05
	Wabtec	1.25
Median		1.05
Arithmetic Mean		1.06

Value Line Investment Survey, November 2022 through January 2023

Mergent 2022 Corporate Bond Yield Averages

	Corporate by Groups		Public Utility Bonds			Industrial Bonds			
Month	***Public Utility***	***Industrial***	***Aa***	***A***	***Baa***	***Aaa***	***Aa***	***A***	***Baa***
January	3.25%	3.46%	3.19%	3.33%	3.57%	2.93%	2.83%	3.17%	3.59%
February	3.48%	3.73%	3.56%	3.68%	3.95%	3.25%	3.16%	3.52%	3.99%
March	4.02%	3.74%	3.81%	3.98%	4.28%	3.43%	3.43%	3.77%	4.30%
April	4.34%	4.09%	4.10%	4.32%	4.61%	3.76%	3.76%	4.13%	4.70%
May	4.79%	4.50%	4.55%	4.75%	5.07%	4.13%	4.17%	4.55%	5.16%
June	4.91%	4.64%	4.65%	4.86%	5.22%	4.24%	4.32%	4.68%	5.31%
July	4.84%	4.51%	4.57%	4.78%	5.15%	4.06%	4.16%	4.55%	5.27%
August	4.80%	4.49%	4.54%	4.76%	5.09%	4.07%	4.17%	4.53%	5.21%
September	5.33%	5.03%	5.08%	5.28%	5.61%	4.59%	4.66%	5.08%	5.77%
October	5.91%	5.53%	5.68%	5.88%	6.18%	5.10%	5.11%	5.59%	6.33%
November	5.78%	5.32%	5.54%	5.75%	6.05%	4.90%	4.92%	5.40%	6.08%
December	5.30%	4.87%	5.06%	5.28%	5.57%	4.43%	4.48%	4.94%	5.61%
	4.73%	4.49%	4.53%	4.72%	5.03%	4.07%	4.10%	4.49%	5.11%

Telecommunications Services Industry

2023 Capitalization Rate Study
Telecommunication Services Industry Notes

- From the Telecommunication Services segment, America Movil S.A.B. de CV, Deutsche Telecom AG, Telefonica SA, TELUS Corporation, Vodafone Group PLC, Liberty Latin America Ltd., Millicom International Cellular S.A., and BCE Inc. were excluded as being principally, primarily, or due to a large international, operational presence, heavily involved in non-domestic operations. Dycom industries, Inc. was excluded as the company is principally engaged in the telecommunications and electrical services business providing engineering, construction, maintenance and installation to telecommunication providers. Ziff Davis Inc. was excluded as they principally offer value-added and tandem interconnection services. Zoom Video Communications, Inc. was excluded as the company is principally engaged in meetings, chat, webinars, and online events. Frontier Communications Parent, Inc. was excluded due to a lack of sufficient financial information and data.

- Staff considered capitalization studies and/or information submitted by:

  Hal Heaton, PhD. – The Cost of Capital for AT&T ILEC Telephone Operating Property
  AT&T – Overview of the Wireless Segment of the Telecommunications Industry as of February 2023
  AT&T – Overview of the Wireline Segment of the Telecommunications Industry as of February 2023

Staff relied upon the results of the following models and appraisal judgment in the development of equity rates:

1. Discounted Cash Flow
2. Capital Asset Pricing Model, Ex-Post and Ex-Ante
3. Earnings/Price Ratio

Industry Capitalization Rate

Industry	*Equity Rate*	*Market Capitalization*	*Long Term Debt*	*Capitalization Rate*
Telecommunications Services	12.10%	60.48%	39.52%	9.34%

Mergent 2022 Twelve Month Bond Yield Averages

Industry Equity Rate Summary

Telecommunications Services

CapM Ex Post Equity Rate	10.27%
CapM Ex Ante Equity Rate	11.42%
DCF (Dividend) Equity Rate	9.85%
DCF (Earnings) Equity Rate	13.32%
Earnings Price Ratio	13.73%

CapM Equity Rates

Industry	*Ex Post Risk Premium b**	*Ex Ante Risk Premium c**	*Value Line Beta d*	*Ex Post CAPM Equity Rate (((b-3.87%)*d)+3.87%)*	*Ex Ante CAPM Equity Rate (((c-3.87%)*d)+3.87%)*
Telecommunications Services	11.04%	12.33%	0.89	10.27%	11.42%

b* Risk Free Rate (3.87%) plus Risk Premium Rate (7.17%)

c* Risk Free Rate (3.87%) plus Risk Premium Rate (8.46%)

20-Yr LT Treasury Yield, Value Line Investment Survey, November 2022 through January 2023, Kroll Cost of Capital Navigator

Discounted Cash Flow (Gordon Growth)

Industry	Company	Value Line Strength	Market Capitalization d	Dividend Yield e	Growth Estimate Dividends f	Growth Estimate Earnings g	Equity Rate Dividend (e+f)	Equity Rate Earnings (e+g)
Telecommunications Services								
	AT&T Inc.	B++	134,000,000,000	5.90%	-6.50%	1.00%		6.90%
	IDT Corporation	B	675,000,000	0.00%	0.00%	23.00%		23.00%
	Iridium Communications, Inc.	B	6,500,000,000	0.00%	0.00%	0.00%		
	Lumen Technologies, Inc.	B	5,700,000,000	0.00%	3.00%	1.50%		
	Shenandoah Telecommunications Company (Shentel)	B+	950,000,000	0.50%	-7.00%	2.50%		
	T-Mobile US, Inc.	A	187,000,000,000	0.00%	0.00%	16.50%		16.50%
	Telephone & Data Systems, Inc.	B+	1,100,000,000	7.40%	3.00%	3.50%	10.40%	10.90%
	U.S. Cellular	B+	1,700,000,000	0.00%	0.00%	0.50%		
	Verizon Communications	A++	161,000,000,000	6.80%	2.50%	2.50%	9.30%	9.30%
Median			5,700,000,000				9.85%	10.90%
Arithmetic Mean			55,402,777,778				9.85%	13.32%

Value Line Investment Survey, November 2022 through January 2023

E/P Ratio

Industry	Company	Value Line Strength	Market Capitalization c	Recent Price d	Projected Earnings e	E/P Ratio (e/d)
Telecommunications Services						
	AT&T Inc.	B++	134,000,000,000	18.82	3.45	18.33%
	IDT Corporation	B	675,000,000	26.03	3.25	12.49%
	Iridium Communications, Inc.	B	6,500,000,000	51.52	1.85	3.59%
	Lumen Technologies, Inc.	B	5,700,000,000	5.52	2.15	38.95%
	Shenandoah Telecommunications Company (Shentel)	B+	950,000,000	18.88	0.55	2.91%
	T-Mobile US, Inc.	A	187,000,000,000	149.90	9.00	6.00%
	Telephone & Data Systems, Inc.	B+	1,100,000,000	9.88	1.60	16.19%
	U.S. Cellular	B+	1,700,000,000	20.36	2.00	9.82%
	Verizon Communications	A++	161,000,000,000	38.24	5.85	15.30%
Median			5,700,000,000			12.49%
Arithmetic Mean			55,402,777,778			13.73%

Value Line Investment Survey, November 2022 through January 2023

Capital Structure

Industry	Company	Value Line Strength	Market Capitalization c	Long Term Debt d	Debt/Equity Ratio (d/c)	Percentage Equity (c/(c+d))	Percentage Debt (d/(c+d))
Telecommunications Services							
	AT&T Inc.	B++	134,000,000,000	123,854,000,000	0.92	51.97%	48.03%
	IDT Corporation	B	675,000,000	0		100.00%	0.00%
	Iridium Communications, Inc.	B	6,500,000,000	1,572,500,000	0.24	80.52%	19.48%
	Lumen Technologies, Inc.	B	5,700,000,000	21,764,000,000	3.82	20.75%	79.25%
	Shenandoah Telecommunications Company (Shentel)	B+	950,000,000	24,900,000	0.03	97.45%	2.55%
	T-Mobile US, Inc.	A	187,000,000,000	71,889,000,000	0.38	72.23%	27.77%
	Telephone & Data Systems, Inc.	B+	1,100,000,000	3,608,000,000	3.28	23.36%	76.64%
	U.S. Cellular	B+	1,700,000,000	3,115,000,000	1.83	35.31%	64.69%
	Verizon Communications	A++	161,000,000,000	132,912,000,000	0.83	54.78%	45.22%
Median			5,700,000,000	3,608,000,000	0.87	54.78%	45.22%
Arithmetic Mean			55,402,777,778	39,859,933,333	1.42	59.60%	40.40%
Weighted Average			158,287,687,390	103,448,633,753		60.48%	39.52%

Value Line Investment Survey, November 2022 through January 2023

Beta

Industry	*Company*	*Value Line Levered Beta*
Telecommunications Services, Selected Comparables		
	AT&T Inc.	
	IDT Corporation	1.05
	Iridium Communications, Inc.	1.15
	Lumen Technologies, Inc.	1.00
	Shenandoah Telecommunications Company (Shentel)	
	T-Mobile US, Inc.	0.80
	Telephone & Data Systems, Inc.	0.95
	U.S. Cellular	0.70
	Verizon Communications	0.60
Median		0.95
Arithmetic Mean		0.89

Value Line Investment Survey, November 2022 through January 2023

Beta

Industry	Company	Value Line Levered Beta
Telecommunications Services, Value Line		
	AT&T Inc.	
	American Movil, S.A.B. de C.V.	0.85
	BCE Inc.	0.90
	Deutsche Telekom AG	0.85
	Dycom Industries, Inc.	1.45
	Frontier Communications Parent, Inc.	
	IDT Corporation	1.05
	Iridium Communications, Inc.	1.15
	Ziff Davis, Inc.	1.05
	Lumen Technologies, Inc.	1.00
	Shenandoah Telecommunications Company (Shentel)	
	T-Mobile US, Inc.	0.80
	Telefonica, S.A.	0.85
	Telephone & Data Systems, Inc.	0.95
	TELUS Corporation	0.70
	U.S. Cellular	0.70
	Verizon Communications	0.60
	Vodafone Group Plc	0.95
	Zoom Video Communications, Inc.	0.45
	Liberty Latin America Ltd.	1.20
	Millicom International Cellular SA	1.30
Median		0.93
Arithmetic Mean		0.93

Value Line Investment Survey, November 2022 through January 2023

Mergent 2022 Corporate Bond Yield Averages

	Corporate by Groups		Public Utility Bonds			Industrial Bonds			
Month	***Public Utility***	***Industrial***	***Aa***	***A***	***Baa***	***Aaa***	***Aa***	***A***	***Baa***
January	3.25%	3.46%	3.19%	3.33%	3.57%	2.93%	2.83%	3.17%	3.59%
February	3.48%	3.73%	3.56%	3.68%	3.95%	3.25%	3.16%	3.52%	3.99%
March	4.02%	3.74%	3.81%	3.98%	4.28%	3.43%	3.43%	3.77%	4.30%
April	4.34%	4.09%	4.10%	4.32%	4.61%	3.76%	3.76%	4.13%	4.70%
May	4.79%	4.50%	4.55%	4.75%	5.07%	4.13%	4.17%	4.55%	5.16%
June	4.91%	4.64%	4.65%	4.86%	5.22%	4.24%	4.32%	4.68%	5.31%
July	4.84%	4.51%	4.57%	4.78%	5.15%	4.06%	4.16%	4.55%	5.27%
August	4.80%	4.49%	4.54%	4.76%	5.09%	4.07%	4.17%	4.53%	5.21%
September	5.33%	5.03%	5.08%	5.28%	5.61%	4.59%	4.66%	5.08%	5.77%
October	5.91%	5.53%	5.68%	5.88%	6.18%	5.10%	5.11%	5.59%	6.33%
November	5.78%	5.32%	5.54%	5.75%	6.05%	4.90%	4.92%	5.40%	6.08%
December	5.30%	4.87%	5.06%	5.28%	5.57%	4.43%	4.48%	4.94%	5.61%
	4.73%	4.49%	4.53%	4.72%	5.03%	4.07%	4.10%	4.49%	5.11%

Water Utility Industry

2023 Capitalization Rate Study
Water Industry Notes

- Recognizing the Water Industry segment from Value Line.

- Staff considered capitalization studies and/or information submitted by:

  No Submissions

- Staff relied upon the results of the following models and appraisal judgment in the development of equity rates:

  1. Discounted Cash Flow
  2. Capital Asset Pricing Model, Ex-Post and Ex-Ante
  3. Earnings/Price Ratio

Industry Capitalization Rate

Industry	*Equity Rate*	*Market Capitalization*	*Long Term Debt*	*Capitalization Rate*
Water	10.20%	71.10%	28.90%	8.71%

Mergent 2022 Twelve Month Bond Yield Averages

Industry Equity Rate Summary

Water

CapM Ex Post Equity Rate	9.49%
CapM Ex Ante Equity Rate	10.50%
DCF (Dividend) Equity Rate	9.08%
DCF (Earnings) Equity Rate	9.84%
Earnings Price Ratio	3.93%

CapM Equity Rates

Industry	*Ex Post Risk Premium b**	*Ex Ante Risk Premium c**	*Value Line Beta d*	*Ex Post CAPM Equity Rate (((b-3.87%)*d)+3.87%)*	*Ex Ante CAPM Equity Rate (((c-3.87%)*d)+3.87%)*
Water	11.04%	12.33%	0.78	9.49%	10.50%

b* Risk Free Rate (3.87%) plus Risk Premium Rate (7.17%)

c* Risk Free Rate (3.87%) plus Risk Premium Rate (8.46%)

20-Yr LT Treasury Yield, Value Line Investment Survey, November 2022 through January 2023, Kroll Cost of Capital Navigator

Discounted Cash Flow (Gordon Growth)

Industry	Company	Value Line Strength	Market Capitalization d	Dividend Yield e	Growth Estimate Dividends f	Growth Estimate Earnings g	Equity Rate Dividend (e+f)	Equity Rate Earnings (e+g)
Water								
	American States Water Co.	A	3,400,000,000	1.80%	9.00%	5.50%	10.80%	7.30%
	American Water Works Company, Inc.	B++	27,800,000,000	1.80%	8.50%	3.00%	10.30%	
	California Water Service Group	B++	3,400,000,000	1.60%	6.50%	6.50%	8.10%	8.10%
	Essential Utilities, Inc.	B++	12,500,000,000	2.50%	8.00%	10.00%	10.50%	12.50%
	MiddleSex Water Company	B++	1,500,000,000	1.50%	6.00%	6.00%	7.50%	7.50%
	SJW Group	B+	2,500,000,000	1.80%	5.50%	12.00%	7.30%	13.80%
Median			3,400,000,000				9.20%	8.10%
Arithmetic Mean			8,516,666,667				9.08%	9.84%

Value Line Investment Survey, November 2022 through January 2023

E/P Ratio

Industry	*Company*	*Value Line Strength*	*Market Capitalization c*	*Recent Price d*	*Projected Earnings e*	*E/P Ratio (e/d)*
Water						
	American States Water Co.	A	3,400,000,000	93.72	3.25	3.47%
	American Water Works Company, Inc.	B++	27,800,000,000	153.02	5.75	3.76%
	California Water Service Group	B++	3,400,000,000	61.78	2.55	4.13%
	Essential Utilities, Inc.	B++	12,500,000,000	47.57	2.25	4.73%
	MiddleSex Water Company	B++	1,500,000,000	86.05	3.00	3.49%
	SJW Group	B+	2,500,000,000	81.02	3.25	4.01%
Median			3,400,000,000			3.88%
Arithmetic Mean			8,516,666,667			3.93%

Value Line Investment Survey, November 2022 through January 2023

Capital Structure

Industry	Company	Value Line Strength	Market Capitalization c	Long Term Debt d	Debt/Equity Ratio (d/c)	Percentage Equity (c/(c+d))	Percentage Debt (d/(c+d))
Water							
	American States Water Co.	A	3,400,000,000	446,800,000	0.13	88.39%	11.61%
	American Water Works Company, Inc.	B++	27,800,000,000	10,940,000,000	0.39	71.76%	28.24%
	California Water Service Group	B++	3,400,000,000	1,053,900,000	0.31	76.34%	23.66%
	Essential Utilities, Inc.	B++	12,500,000,000	6,173,600,000	0.49	66.94%	33.06%
	MiddleSex Water Company	B++	1,500,000,000	301,200,000	0.20	83.28%	16.72%
	SJW Group	B+	2,500,000,000	1,453,700,000	0.58	63.23%	36.77%
Median			3,400,000,000	1,253,800,000	0.35	74.05%	25.95%
Arithmetic Mean			8,516,666,667	3,394,866,667	0.35	74.99%	25.01%
Weighted Average			18,800,587,084	7,641,691,389		71.10%	28.90%

Value Line Investment Survey, November 2022 through January 2023

Beta

Industry	*Company*	*Value Line Levered Beta*
Water, Selected Comparables		
	American States Water Co.	0.65
	American Water Works Company, Inc.	0.90
	California Water Service Group	0.70
	Essential Utilities, Inc.	0.95
	MiddleSex Water Company	0.70
	SJW Group	0.80
Median		0.75
Arithmetic Mean		0.78
Water, Value Line		
	American States Water Co.	0.65
	American Water Works Company, Inc.	0.90
	California Water Service Group	0.70
	Essential Utilities, Inc.	0.95
	MiddleSex Water Company	0.70
	SJW Group	0.80
Median		0.75
Arithmetic Mean		0.78

Value Line Investment Survey, November 2022 through January 2023

Mergent 2022 Corporate Bond Yield Averages

Month	Corporate by Groups		Public Utility Bonds			Industrial Bonds			
	Public Utility	Industrial	Aa	A	Baa	Aaa	Aa	A	Baa
January	3.25%	3.46%	3.19%	3.33%	3.57%	2.93%	2.83%	3.17%	3.59%
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December	5.30%	4.87%	5.06%	5.28%	5.57%	4.43%	4.48%	4.94%	5.61%
	4.73%	4.49%	4.53%	4.72%	5.03%	4.07%	4.10%	4.49%	5.11%